

AIR QUALITY

SUB-ELEMENT OF THE GENERAL PLAN

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AIR QUALITY

SUB-ELEMENT OF THE GENERAL PLAN

CITY OF SUNNYVALE

The Sub-Element complies with California Government
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Planning Division
Sunnyvale, California

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City of Sunnyvale
Air Quality Sub-Element
of the General Plan

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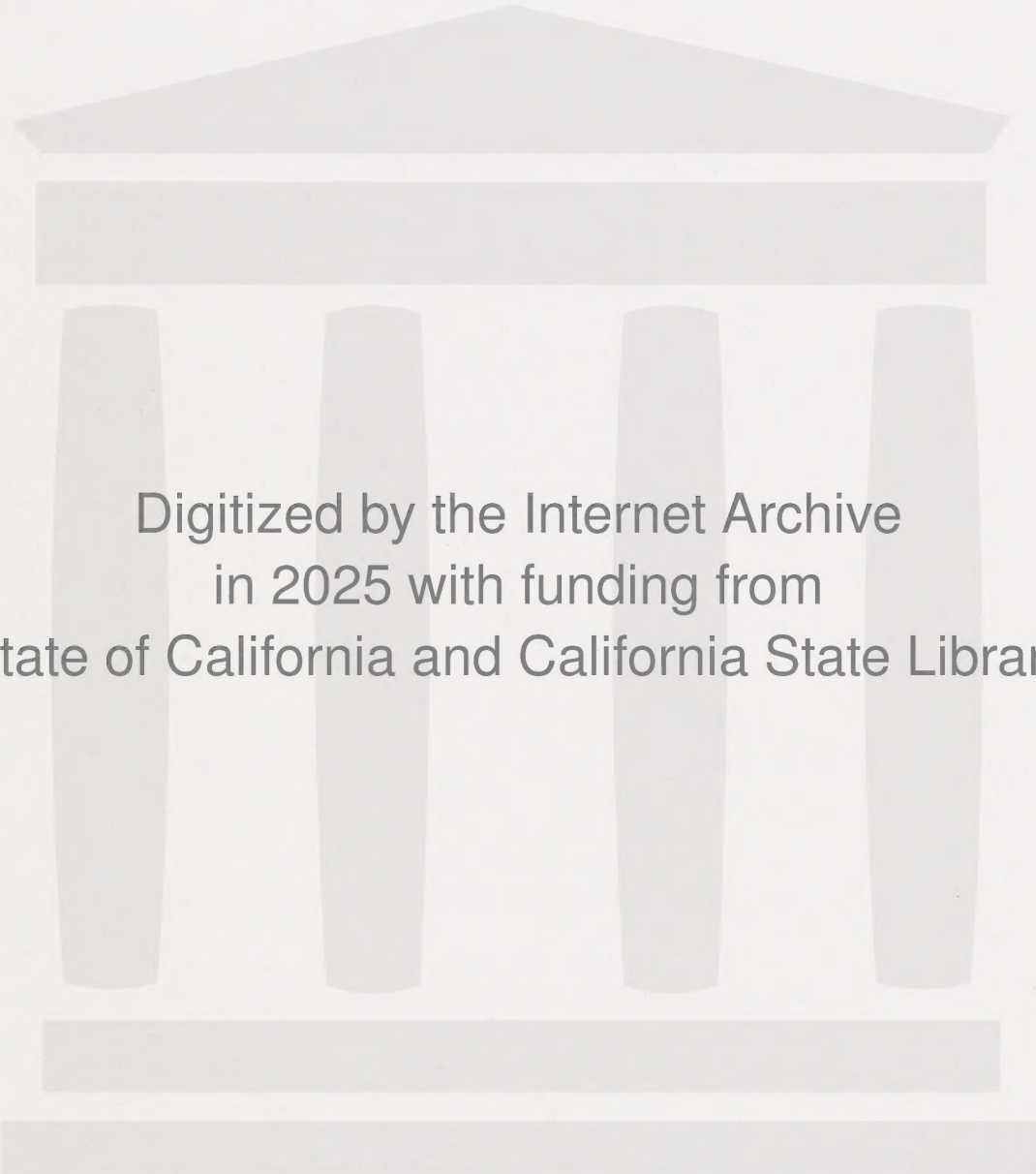
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PREFACE

This Air Quality Sub-Element establishes a policy framework to reduce air pollutant emissions from existing sources in Sunnyvale, lessen the emissions associated with future development, and reduce the exposure of residents to unhealthful levels of air contaminants. In recent years, increasing attention has been given to the influence of local policies regarding air quality and related policies concerning land use, community design and transportation.

The impetus for adopting an Air Quality Sub-Element comes from the California Clean Air Act and the regional plan mandated by that legislation. The Bay Area '91 Clean Air Plan adopted the use of air quality elements for cities and counties as a Transportation Control Measure and also includes an Indirect Source Control program. The delegation of authority to cities to implement the Indirect Source Control program would be dependent on the City having an Air Quality Element (or Sub-Element) within its General Plan.

The adoption of the Air Quality Sub-Element fulfills the requirements of the California Clean Air Act and the regional air quality plan. This Sub-Element would formalize Sunnyvale's policy to protect the environmental quality of Sunnyvale and the larger Bay Area by promoting community development which is compatible with air quality standards and minimizing the impact of future development on air quality. The Air Quality Sub-Element allows the City to address more comprehensive solutions to cumulative impacts on air quality early in the planning process. To solve air pollution and congestion problems, fundamental changes in land use and travel patterns are necessary because motor vehicles and stationary sources are already being regulated with the most up-to-date pollution control devices, though new state requirements on alternative fuels will provide further reductions in vehicle emissions. At stake are not only federal funds, but also human health, economic prosperity, and the overall quality of life.

The Air Quality Sub-Element is a new sub-element of the Environmental Management Element of the City's General Plan. The other sub-elements of the Environmental Management Element include Water Resources, Sanitary Sewer System, Surface Runoff, Energy and Noise. With careful management and planning, the City of Sunnyvale can preserve its environment and natural resources.

TABLE OF CONTENTS

	Page
Preface.....	iii
Table of Figures.....	vii
Executive Summary.....	1
Introduction.....	1
Purpose.....	1
Major Findings.....	2
Summary of Goals and Policies	3
Community Conditions.....	5
Air Pollution Climatology.....	5
Air Pollution Standards.....	6
Ozone	8
Carbon Monoxide.....	8
Nitrogen Dioxide.....	9
Sulfur Dioxide.....	9
Suspended Particulate Matter (PM-10).....	9
Current and Past Air Quality in Sunnyvale.....	10
Regional Air Quality Planning.....	12
Federal Program.....	16
State Program	17
California Clean Air Act	17
Congestion Management Program	18
Air Pollutant Sources	22
Criteria Pollutants.....	22
Toxic Air Contaminant Sources.....	22
Sensitive Receptors	23
Future Air Quality	25
Local Air Quality	26
Regional Air Quality.....	28

	Page
Local and Regional Air Quality Issues and Programs	33
Local	33
Bicycle Plan/Bicycle Advisory Committee	34
Bicycle Facilities	35
City Sidewalks	35
Preferential Parking	36
Water Pollution Control Plant Gas Control/Recovery System	36
Tree Planting Program and Tree Preservation Ordinance	36
Traffic Signal Improvement and Synchronization	37
Sunnyvale's Futures Study	37
Fleet Management and Alternative Fuels Program	38
Ten-Year Capital Improvements Plan	38
Regional	39
Measure A (1984)	39
Measure A (1992)	40
Lawrence Expressway High Occupancy Vehicle (HOV) Project	40
Transportation Demand Management (TDM)/Trip Reduction	40
Toxic Gas Ordinance	42
Landfill Gas Recovery System	42
Sunnyvale Materials and Recovery Transfer (SMaRT) Station	43
Interrelationships With Other Sub-Elements	45
Community Design Sub-Element	45
Land Use Sub-Element	45
Housing and Community Revitalization Sub-Element	46
Energy Sub-Element	46
Transportation Element	47
Socio-Economic Element	49
Goals, Policies and Action Statements	51
Introduction	51
Goals	53
Appendix A	A1
Glossary	A2
Appendix B	B1
CALINE-4 Assumptions and Methodology	B2
Appendix C	C1
URBEMIS-3 Program and Assumptions	C2
Resolution	R1
Resolution No. 166-93	R2

TABLE OF FIGURES

Figure		Page
1	Federal and State Ambient Air Quality Standards	7
2	Summary of Air Quality Data for the Southern Peninsula, 1989 - 1991	11
3	South Bay Ozone Air Quality, 1983-1991	13
4	South Bay Carbon Monoxide Air Quality, 1983-1991	14
5	South Bay PM-10 Air Quality, 1986-1991	15
6	Existing and Year 2010 Carbon Monoxide Concentrations, in PPM.....	27
7	Indirect Emissions Associated with General Plan Buildout and County-Wide Projected Emissions, in Pounds/Day	31

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

Introduction

All major urban areas in California, including Sunnyvale, experience some degree of reduced air quality. The combination of climatic conditions and a multitude of air pollutant sources (particularly the automobile) results in reduced air quality, which can be considered as reducing the quality of life by adversely affecting human health, causing damage to plants or crops, and other effects such as soiling, visibility reduction and accelerated corrosion of materials.

Federal, state and local governments have made concerted efforts over the past 20 years to improve air quality. These attempts have consisted mainly of applications of new technology to control the rate of emissions. Examples are scrubbers for industrial sources and catalytic converters on automobiles. These efforts have resulted in a gradual improvement in air quality over the past twenty years despite increases in population. Violations of ambient air quality standards still occur in the Bay Area, however.

One of the major reasons that air quality continues to be a problem in the Bay Area specifically and California in general, is a relatively high rate of population and economic growth. The major obstacle to improved air quality in the future is increasing population and vehicle use and deteriorating operating conditions on highways and roads.

The most efficient and cost-effective technological or "hardware" controls have already been implemented. Remaining technological controls, which are increasingly expensive, have been found to be unable to reduce emissions to the point where all air quality standards would be met. Therefore, attention has been focused in recent years on the relationship of land use, community design and transportation as a means of reducing air pollutant generation.

The concept of an Air Quality Element or Sub-Element within a General Plan is rather recent, and is a natural outgrowth of the relationship between land use, transportation and air quality. This approach has recently gained favor as a means of addressing the basic problems of growth and its cumulative effect on local and regional air quality. The extent that future growth affects air quality will be partially determined by the form that new land uses take, and the transportation options available to new residents.

Purpose

The adoption of an Air Quality Sub-Element would clearly state Sunnyvale's policy to protect the health, safety, welfare and environmental quality of Sunnyvale and the larger Bay Area. The Sub-Element would promote community development that is compatible with air quality standards, minimizing the impact of future development on air quality.

In a larger sense, an Air Quality Sub-Element is part of the regional strategy for improving air quality. While air quality is often regarded as a regional problem, local land use and growth decisions by cities and counties will affect the success of whatever technology is available regionally to combat air pollution. The **Bay Area Air Quality Management District** (BAAQMD) has adopted a resolution urging cities and counties within the nine-county Bay Area to adopt Air Quality Elements¹, and the adoption of Air Quality Elements by cities is a major element of the Bay Area Air Quality Management District's indirect source program within the Bay Area '91 Clean Air Plan.

Major Findings

The following major findings are derived from information presented within the Air Quality Sub-Element. These findings form the basis of the goals and policies which follow.

1. Past efforts by federal, state and local governments have resulted in steady, gradual improvement in air quality in Sunnyvale and the greater Bay Area. The City of Sunnyvale has implemented a number of programs that directly or indirectly reduce air pollutant emissions.
2. Despite considerable improvement in air quality over a period of 20 years, air quality in Sunnyvale and the greater Bay Area still does not meet all ambient air quality standards, and the latest projections do not show attainment of all ambient air quality standards by the year 2000.
3. Although Sunnyvale is a "mature" community, potential future growth in population and employment could have a substantial effect on future air quality.
4. Sunnyvale contains numerous sources of Toxic Air Contaminants and numerous "sensitive receptors"; special attention to site planning is needed to reduce exposure of residents to these pollutants.
5. Indirect source controls (site planning, land use or transportation strategies to reduce vehicle trip generation) will become increasingly important in the future. Implementation of indirect source controls on the local level is an integral part of regional programs such as the Bay Area '91 Clean Air Plan and the county Congestion Management Program.

¹ Bay Area Air Quality Management District, Resolution Number 1666, May 21, 1986

Summary of Goals and Policies

This section is a summary of the goals and policies contained in this Sub-Element. Detailed goals and policies and supporting action statements are listed in body of the Sub-Element.

Goal A: Improve Sunnyvale's Air Quality and Reduce the Exposure of its Citizens to Air Pollutants

- Policy A.1: Require all new development to utilize site planning to protect citizens from unnecessary exposure to air pollutants.
- Policy A.2: Reduce automobile emissions through traffic and transportation improvements. Since traffic congestion delays increase the level of emissions, congestion management has air quality benefits.

Goal B: Reduce Air Pollution Impacts from Future Development

- Policy B.1: Utilize land use strategies to reduce air quality impact.
- Policy B.2: Assist employers in meeting the requirements of the Transportation Demand Management (TDM) plans for existing and future large employers, and explore requiring TDM plans for employment centers in Sunnyvale.

Goal C: Make a Contribution Towards Improving Regional Air Quality

- Policy C.1: The City should actively participate in regional air quality planning.
- Policy C.2: Improve opportunities for citizens to live and work in close proximity.
- Policy C.3: Contribute to a reduction in Regional Vehicle Miles Travelled.
- Policy C.4: Reduce Emissions from City of Sunnyvale fleet vehicles

COMMUNITY CONDITIONS

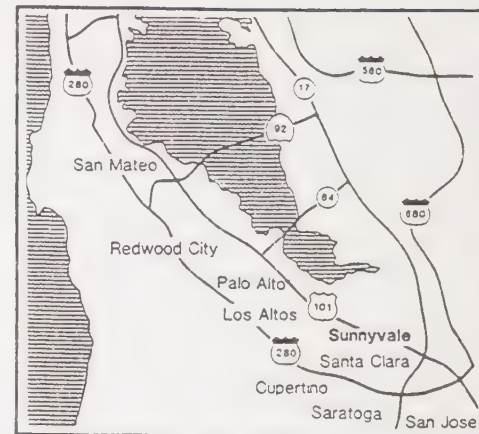
COMMUNITY CONDITIONS

Air Pollution Climatology

The amount of a given pollutant in the atmosphere is determined by the amount of pollutant released and the atmosphere's ability to transport and dilute the pollutant. The major determinants of transport and dilution are wind, atmospheric stability, terrain and, for photochemical pollutants, sunshine.

Northwest winds and northerly winds are most common in Sunnyvale, reflecting the orientation of the Bay and the San Francisco Peninsula. Winds from these directions carry pollutants released by autos and factories from upwind areas of the Peninsula towards Sunnyvale, particularly during the summer months. Winds are lightest on the average in fall and winter. Every year in fall and winter there are periods of several days when winds are very light and local pollutants build up.

Pollutants can be diluted by mixing in the atmosphere both vertically and horizontally. Vertical mixing and dilution of pollutants is often suppressed by inversion conditions, when a warm layer of air traps cooler air close to the surface. During the summer, **inversions**² are generally elevated above ground level, but are present over 90 percent of the time in both the morning and afternoon. In winter, surface-based inversions dominate in the morning hours, but frequently dissipate by afternoon.



² Words included in the Glossary (Appendix A) are shown in bold type the first time they appear.

Topography can restrict horizontal dilution and mixing of pollutants by creating a barrier to air movement. While Sunnyvale itself has relatively flat terrain, the larger south bay sub-air basin has significant terrain features that affect air quality. The Santa Cruz Mountains and Hayward Hills on either side of the south bay tend to restrict horizontal dilution, and this alignment of the terrain also channels winds from the north to south, carrying pollution from the northern Peninsula towards Sunnyvale.

The combined effects of moderate ventilation, frequent inversions that restrict vertical dilution and terrain that restricts horizontal dilution give Sunnyvale a relatively high atmospheric **pollution potential**.

Air Pollution Standards

The Mulford-Carrell Act of 1969 and the Clean Air Act of 1970 established state and federal **air quality standards** for several pollutants. These standards are divided into primary standards, designed to protect the public health, and secondary standards, intended to protect the public welfare from effects such as visibility reduction, soiling, nuisance and other forms of damage. The state and federal standards are summarized in Figure 1.

The pollutants covered under the above-described legislation are known as **criteria pollutants** because the health and other effects of each pollutant are described in criteria documents. Another group of substances known as **Toxic Air Contaminants (TACs)**, are injurious in small quantities and are regulated despite the absence of criteria documents. The identification, regulation and monitoring of TACs is relatively recent compared to that for criteria pollutants.

FIGURE 1
FEDERAL AND STATE AMBIENT AIR QUALITY STANDARDS

Pollutant	Averaging Time ³	Federal Primary Standard ⁴	State Standard ⁵
Ozone	1-Hour	0.12 PPM	0.09 PPM
Carbon Monoxide	8-Hour	9.0 PPM	9.0 PPM
	1-Hour	35.0 PPM	20.0 PPM
Nitrogen Dioxide	Annual	0.05 PPM	---
	1-Hour	---	0.25 PPM
Sulfur Dioxide	Annual	0.03 PPM	---
	24-Hour	0.14 PPM	0.04 PPM
	1-Hour	---	0.25 PPM
Particulates	AGM	50 ug/m ³	30 ug/m ³
	24-Hour	150 ug/m ³	50 ug/m ³
Lead	30-Day	---	1.5 ug/m ³
	3-Month	1.5 ug/m ³	---

PPM = Parts Per Million ug/m³ = Micrograms Per Cubic Meter

³ The state and federal ambient air quality standards are based on exposure, which consists of both an average concentration and duration. The averaging time is the specified time period that concentrations are to be averaged.

⁴ The levels of air quality necessary, with an adequate margin of safety to protect the public health. The national secondary standards are designed to protect public welfare from non-health effects.

⁵ Specified concentrations and durations of air pollutants which reflect the relationship between the intensity and composition of air pollution to undesirable effects established by the California Air Resources Board.

The criteria pollutants and their effects are described below. California state standards are in general more restrictive than the corresponding federal standard, particularly for ozone and PM-10.

Ozone

Ozone is the most prevalent of a class of photochemical oxidants formed in the urban atmosphere, often referred to as **photochemical smog**. The creation of ozone is a result of complex chemical reactions between hydrocarbons and oxides of nitrogen in the presence of sunshine. Unlike other pollutants, ozone is not released directly into the atmosphere from any sources. The major sources of oxides of nitrogen and reactive hydrocarbons, known as **ozone precursors**, are combustion sources such as factories and automobiles, and evaporation of solvents and fuels.

Ozone near the ground is an air pollutant. The same chemical in the stratosphere, about 10 miles above the earth's surface, plays a beneficial role in protecting us from excessive ultraviolet radiation. Surface ozone and stratospheric ozone are independent phenomena.

The known health effects of ozone are eye irritation and damage to lung tissues. Ozone also damages some materials such as rubber, and may damage plants and crops.

Carbon Monoxide

Carbon monoxide is an odorless, colorless gas that is highly toxic. It is formed by the incomplete combustion of fuels, and its main source in the Bay Area is automobiles.

Carbon monoxide's health effects are related to its affinity for hemoglobin in the blood. At high concentrations, carbon

monoxide reduces the amount of oxygen in the blood. This deprivation causes heart difficulties in people with chronic diseases, reduces lung capacity and impairs mental abilities.

Nitrogen Dioxide

Nitrogen dioxide is a reddish-brown toxic gas. It is one of the oxides of nitrogen that result from combustion. It is the only oxide of nitrogen which is toxic; however, other oxides of nitrogen, particularly nitric oxide, are converted to nitrogen dioxide in the presence of sunshine. Major sources of oxides of nitrogen are automobiles and industry.

Nitrogen dioxide reduces visibility and is a pulmonary irritant.

Sulfur Dioxide

Sulfur dioxide is a colorless gas with a pungent, irritating odor. It is created by the combustion of sulfur-containing fuels. This substance is known to oxidize to sulfur trioxide, which combines with moisture in the atmosphere to form a sulfuric acid mist.

Sulfur dioxide damages and irritates lung tissue, and accelerates corrosion of metals.

Suspended Particulate Matter (PM-10)

Suspended particulate matter consists of solid and liquid particles of dust, soot, aerosols and other matter which are small enough to remain suspended in the air for a long period of time. A portion of the suspended particulate matter in the air is due to natural sources such as wind blown dust and pollen. Man-made sources include combustion, automobile exhausts, field burning, factory emissions and travel on both paved and unpaved roads. A

portion of the particulate matter in urban atmospheres is also a result of photochemical processes.

The ambient air quality standards are for suspended particulate matter less than 10 microns in diameter, designated PM-10. The known effects of high concentrations on humans include aggravation of chronic disease and heart/lung disease symptoms. Non-health effects include reduced visibility and soiling of surfaces.

Current and Past Air Quality in Sunnyvale

Sunnyvale is within the Bay Area Air Quality Management District (BAAQMD). The BAAQMD operates a network of monitoring sites throughout the Bay Area, but none are located within Sunnyvale. The closest multi-pollutant monitoring sites are located in downtown San Jose and Redwood City, and a single-pollutant monitoring site is located in neighboring Mountain View. Figure 2 below shows air quality data for criteria pollutants from these sites for 1989 to 1991.

The major air quality problems in the Bay Area are ozone, carbon monoxide and PM-10. The Bay Area is a **nonattainment area** for these three pollutants both under the state and federal air quality programs.

FIGURE 2

SUMMARY OF AIR QUALITY DATA FOR THE SOUTHERN PENINSULA,
1989-1991

Pollutant	Standard	Location	Number of Annual Exceedances:		
			1989	1990	1991
Ozone	Fed. 1-hour	San Jose	1	0	0
		Redwood City	0	0	0
		Mountain View	0	0	0
	State 1-hour	San Jose	9	4	6
		Redwood City	1	0	0
		Mountain View	6	1	3
PM-10 ⁶	Fed. 24-hour	San Jose	0	0	1
		Redwood City	0	0	0
	State 24-hour	San Jose	15	9	10
		Redwood City	10	8	12
Carbon Monoxide	Fed. 8-Hour	San Jose	6	2	4
		Redwood City	0	0	0
Nitrogen Dioxide	State 1-hour	San Jose	0	0	0
		Redwood City	0	0	0

⁶ Samples of suspended particulates are taken every sixth day. The data shown is the number of samples exceeding the federal or state 24-hour standard for PM-10.

Figure 3 shows ozone air quality data for south bay monitoring sites over the 9-year period 1983 to 1991, in terms of the number of days above the state standard each year. Over this period wide variations are evident, related to climatic variation (ozone levels tend to be higher than average when summer temperatures are higher than average, and vice-versa). The overall trend during this period is downward in response to a gradual decrease in the region-wide emission of ozone precursors, but violations of the standard still occur. A general north-to-south deterioration in air quality is also evident from Redwood City to San Jose.

Figure 4 shows air quality data for carbon monoxide for Redwood City and San Jose in terms of the number of days exceeding the 8-hour carbon monoxide standard per year for the period 1983-1991. As with ozone, year-to-year variations are evident related to weather, but a general downtrend is evident.

Figure 5 shows annual exceedances of the state 24-hour PM-10 standard for the period 1986-1991. PM-10 was not measured prior to 1986. A downward trend is evident during this period, but less pronounced than for ozone or carbon monoxide.

Regional Air Quality Planning

Attempts to combat air quality problems began at the federal level with the enactment of the Clean Air Act of 1967. Initial efforts included the establishment of national ambient standards, designation of local air pollution control districts and creation of an air quality monitoring network.

FIGURE 3
SOUTH BAY OZONE AIR QUALITY, 1983-1991

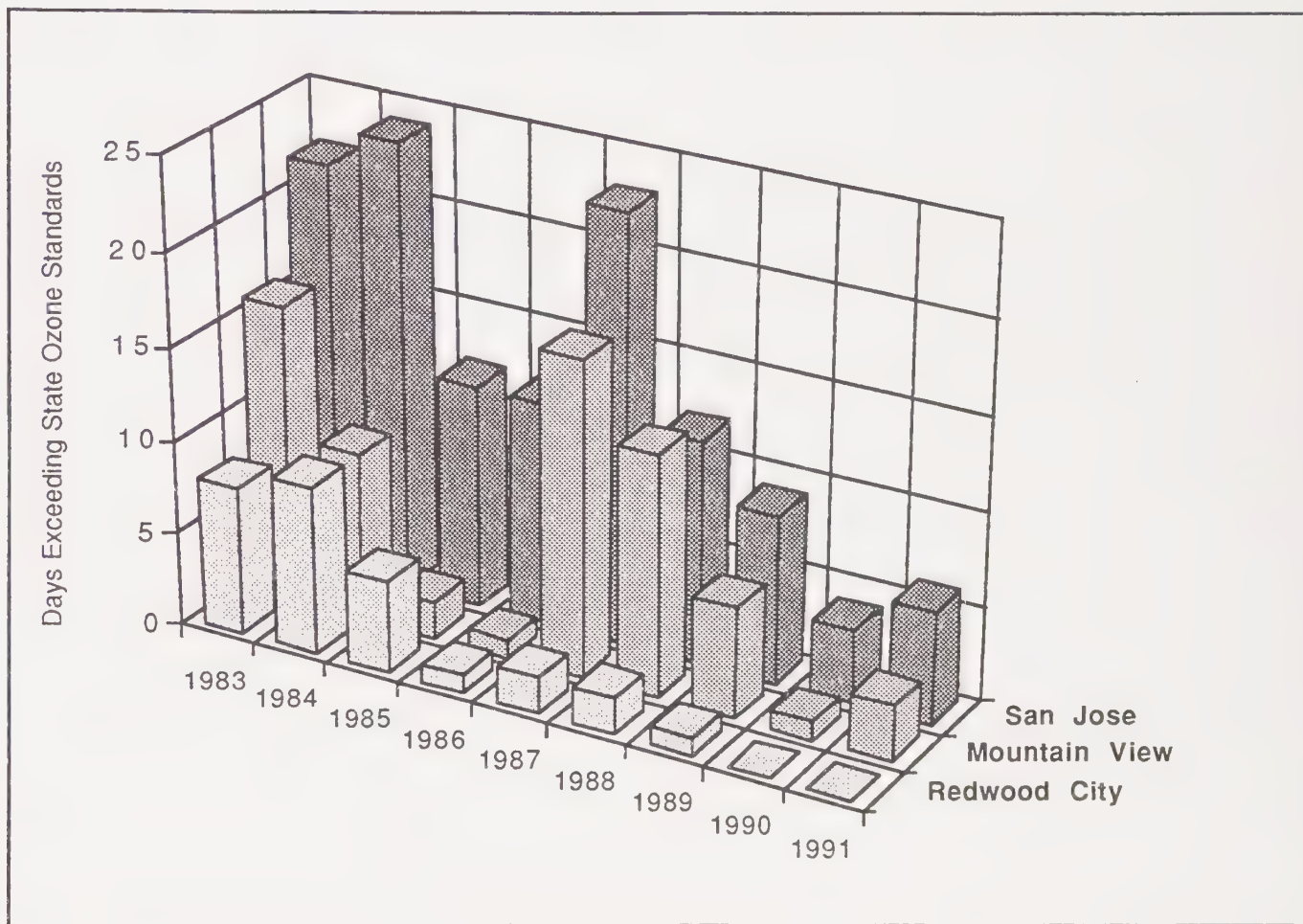


FIGURE 4

SOUTH BAY CARBON MONOXIDE AIR QUALITY, 1983-1991

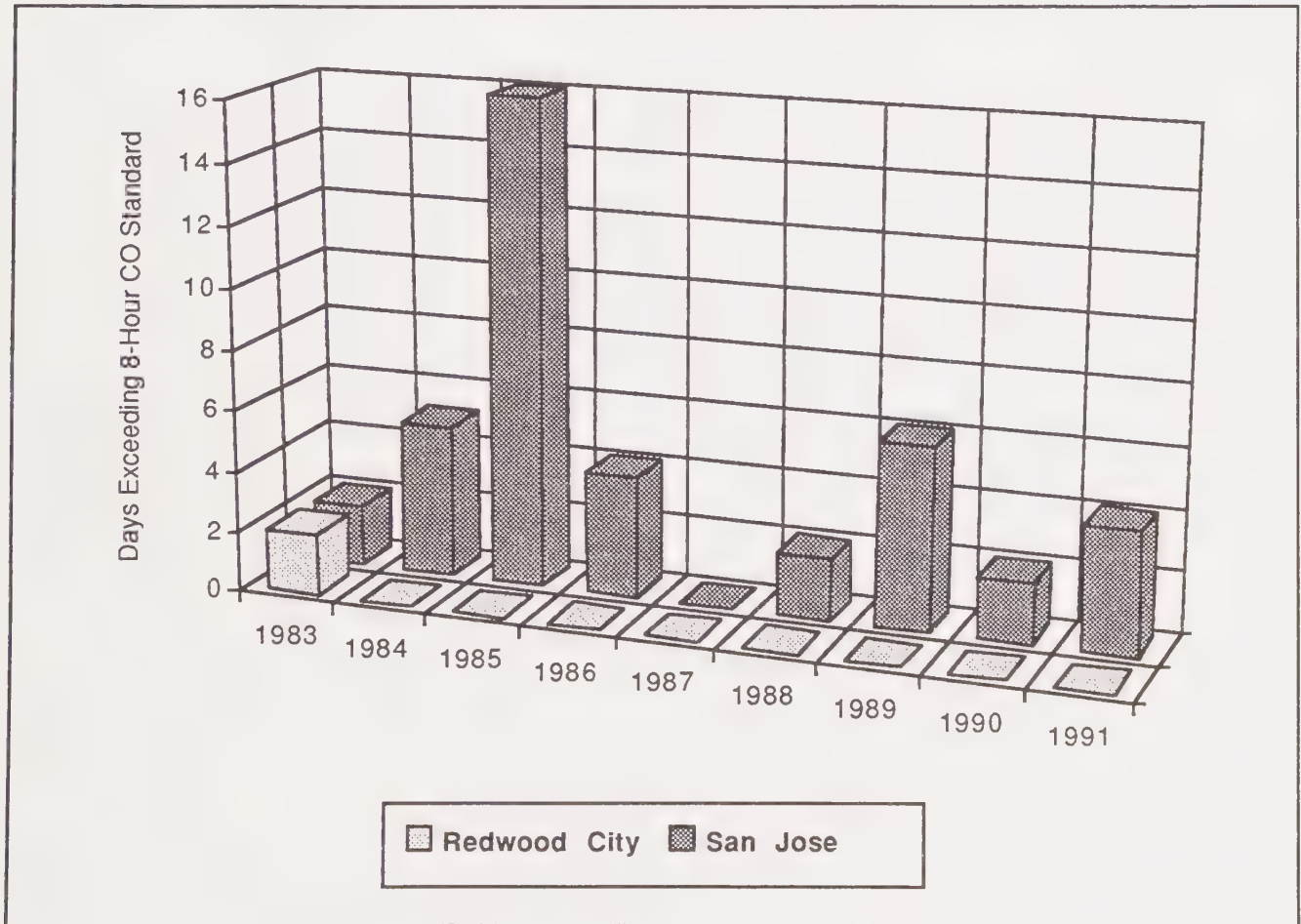
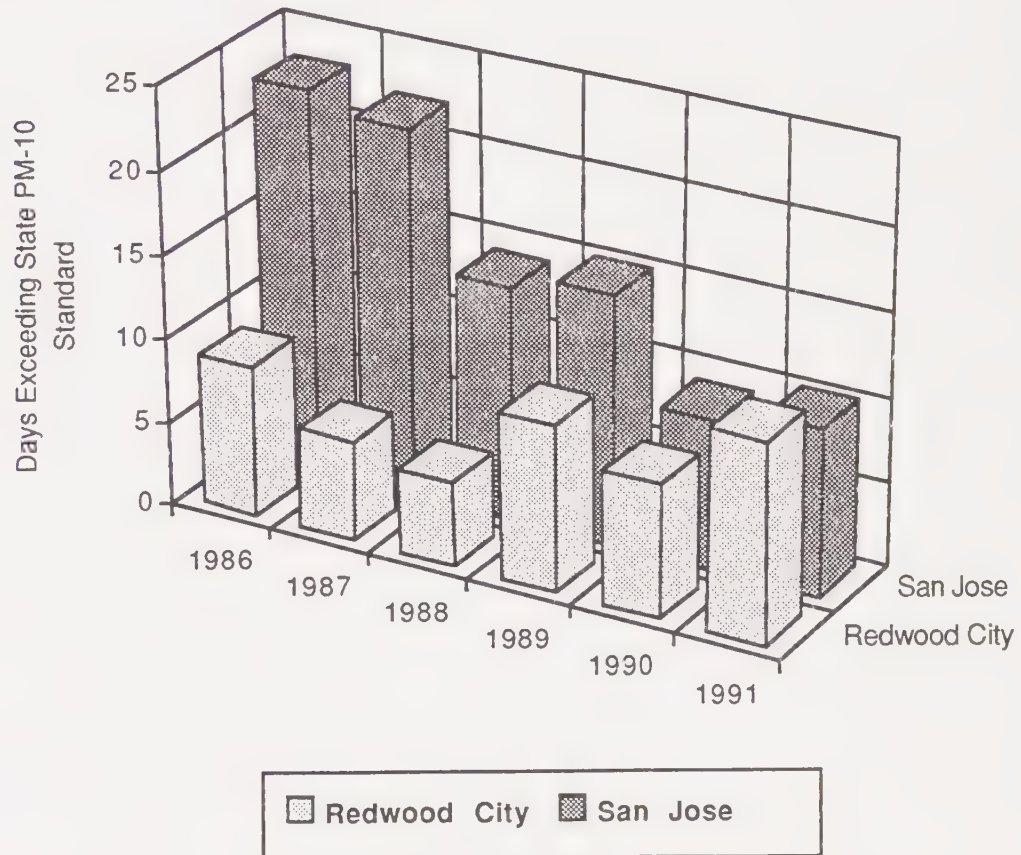


FIGURE 5

SOUTH BAY PM-10 AIR QUALITY, 1986-1991



Over the last 20 years, state and local agencies have adopted regulations on a multitude of air pollutant sources. After obvious and major sources of pollution were controlled (factories, automobiles) controls were implemented on smaller sources (gasoline vending, and solvent-based paints for example).

While the state ambient air quality standards have existed for many years, no state legislative requirement that they be attained existed when the **California Clean Air Act of 1988** was enacted.

Federal Program

The U.S. Clean Air Act Amendments of 1977 required that each state identify areas within its borders that did not meet federal primary standards as non-attainment areas. The states were required to prepare a State Implementation Plan (SIP) to show how the federal standards were to be attained by 1987. The Bay Area portion of the SIP was the 1982 Bay Area Air Quality Plan. Despite considerable improvement in air quality, the Bay Area did not meet the 1987 deadline for attainment of the federal air quality standards.

The federal Clean Air Act Amendments of 1990 require that nonattainment areas develop plans and strategies that will reduce pollutants by 15% during the first 6 years, then 3% annually thereafter until the standards are met. The schedule for attainment is different for different pollutants and depends on the severity of the problem. Failure to meet the requirements of the federal Clean Air Acts could result in the imposition of sanctions (e.g. withholding of highway project funding).

State Program

California Clean Air Act

The California Clean Air Act of 1988 empowers regional air quality management districts with new authority to design, adopt, implement, and enforce comprehensive plans for attaining and maintaining both the federal and the more stringent state air quality standards by the earliest practical date. Among its provisions, the California Clean Air Act provides districts with the authority to establish new controls on mobile sources of pollution.

Specific transportation performance standards are part of the California Clean Air Act requirements, including:

- Substantially reduce the rate of increase in passenger vehicle trips and vehicle miles travelled;
- Achieve a designated vehicle occupancy rate during the peak travel periods by 1999; and
- Provide for no net increase in vehicle emissions beyond the year 1997.
- The introduction of Low Emission Vehicles starting in 1994, with increasing standards beginning in 1997; more stringent emission reductions are required by the year 2003 with the introduction of Zero Emission Vehicles.

The area-wide plan required by the California Clean Air Act was adopted in October 1991.⁷ The Plan proposes the imposition of controls on stationary sources (factories, power plants, industrial sources, etc.) and Transportation

⁷ Bay Area Air Quality Management District, Bay Area '91 Clean Air Plan (CAP), 1991.

Control Measures (TCMs) designed to reduce emissions from automobiles, including **indirect sources**.

The Bay Area '91 Clean Air Plan forecasts continued improvement in regional air quality. An analysis of carbon monoxide trends shows attainment of the standards throughout the Bay Area by the mid-1990s. However, implementation of the Plan would not provide for attainment of the State ozone standard even by the year 2000.

Congestion Management Program

Although the California Clean Air Act (Sher, AB 2595) and **Congestion Management Program** legislation (Katz, AB 471 and AB 1791) are not statutorily linked, the requirements and goals of the two programs overlap. While the Congestion Management Program (CMP) is an independent requirement separate from the California Clean Air Act, it requires appropriate land use, transportation, and air quality agencies to integrate their planning processes, share information and develop a coordinated approach in response to congestion and air quality problems.

One of the purposes of the CMP is to bring about improvements in air quality. With the potential new funding for transportation improvements provided for in the enabling legislation came the requirement that the CMP improve the relationship between transportation, land use and air quality.

The CMP enacting legislation requires that urban counties designate or create a **Congestion Management Agency** to develop a traffic data base, develop guidelines for mitigating deficiencies in the CMP roadway system, and monitor implementation of the CMP elements on an annual basis. The CMA is required to prepare a biennial

Congestion Management Program in order to be eligible for new gas tax subvention. The required elements of the CMP are:

- An element defining the CMP transportation system and Level of Service (LOS) standards;
- A transit service and standards element;
- A transportation demand management and trip reduction element;
- A program for analyzing the impacts of land use decisions and estimating the costs for mitigating these impacts; and
- An element that contains the member agency's Capital Improvement Program (CIP).

There are numerous references to air quality in the CMP legislation. Some references outline consultive roles and cooperative processes that the transportation, land use and air quality agencies should follow in developing the CMP. Other aspects of the legislation require direct links between, or even overlap with the California Clean Air Act. These are:

- The requirement that cities and counties adopt and implement trip reduction ordinances, also required by the California Clean Air Act.
- The Capital Improvement Program Element of the CMP must determine that projects "conform to transportation-related emissions air quality mitigations", which requires that the CIP be consistent with the TCMs included in the state-mandated Clean Air Plan and federal-mandated State Implementation Plan.

- Deficiency plans required under the CMP must contribute to a "significant improvement in air quality".

The CMP legislation also requires that the BAAQMD prepare and adopt a list of deficiency plan actions, improvements and programs that improve system-wide Level of Service (LOS) and improve air quality for use in local deficiency plans.

Deficiency Plans are required by the CMP legislation and allow cities to adopt innovative and comprehensive solutions to LOS deficiencies rather than requiring them to adhere to strict standards for every roadway or intersection. Cities are required to prepare Deficiency Plans for CMP system roadways and intersections located within their jurisdictions that exceed the CMP traffic LOS standard (E in Santa Clara County). LOS is expressed as a volume to capacity ratio, indicated by an alphabetic scale of A through F. LOS A represents free flowing traffic and F is severely congested traffic. Deficiency Plans consist of improvements to roadways, intersections, and other facilities and services which will improve systemwide traffic levels of service and contribute to a significant improvement in air quality. If a CMP roadway or intersection falls below the LOS standard (i.e. LOS E) and the jurisdiction in which the roadway or intersection is located does not have a CMA-approved Deficiency Plan, then the jurisdiction is at risk of losing new gas tax revenues.

Deficiency Plans are intended to allow local jurisdictions to proceed with development projects even if strict adherence to CMP traffic LOS standards can not be achieved for each CMP roadway or intersection. This is particularly important when resulting LOS levels may contradict other community goals, such as mixed-use development near transit lines or higher density residential development in specific areas. In

traffic LOS violation on one particular CMP roadway or intersection for transportation system improvements to other facilities or services (e.g. transit, bicycles, walking or transportation demand management) that will improve systemwide traffic levels of service. A city which implements its Deficiency Plan, and exceeds the traffic LOS standard on a particular roadway or at a specific intersection, will not be found in nonconformance with the CMP and will not risk losing its gas tax revenue.

Below are joint actions that the CMA and member agencies have taken to address air quality issues:

- All Santa Clara County cities have adopted a Transportation Demand Management (TDM) Ordinance which affects employers with 100 or more employees. (In November 1990 the City adopted Sunnyvale's TDM Ordinance, Chapter 10.60 of the Municipal Code).
- The Commuter Network, a subsidiary of the CMA, is the agency delegated to implement the TDM ordinance in Santa Clara County cities. The Commuter Network and many cities have participated in various air quality programs including: Spare the Air campaigns, Earth Day events, Clean Air Week, etc.
- The cities in the county have proposed that various transportation projects from their capital improvement programs be included in the Regional Transportation Improvement Program (RTIP) and the State Transportation Improvement Program (STIP).
- In November, 1992, the CMA approved requirements for deficiency plans.

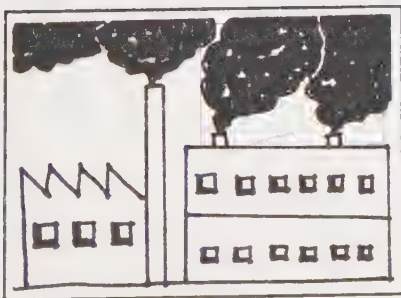
Air Pollution Sources

Criteria Pollutants

Sunnyvale contains a multitude of air pollution sources. The combustion of fuel (for space and water heating, industrial processes and commercial uses) is one such pollutant source, often referred to a **point sources**. The evaporation of fuels and solvents, incineration, fires, and pesticide use are other examples of typical pollutant sources. The largest single source of pollutants is vehicles, which in Santa Clara County are responsible for 89% of the emitted carbon monoxide, 77% of the emitted oxides of nitrogen, 66% of the emitted sulfur dioxide, 57% of the emitted hydrocarbons, and 5% of the emitted particulates.⁸

Sunnyvale does not have heavy industrial sources of pollutants, sometimes termed "smokestack" industries. There are, however, many relatively small sources of industrial emissions located within Sunnyvale industrial areas. Many of these sources are part of the microelectronics industry which create evaporative emissions, primarily from solvent use, rather than combustion emissions.

Toxic Air Contaminant Sources



Assembly Bill 2588, the Toxic "Hot Spots" Information and Assessment Act of 1987, requires that industry provide information to the public about emissions of **toxic air contaminants** and their impact on public health. This law required local air districts and the state Air Resources Board to prepare a detailed inventory of sources of over 200 toxic air contaminants, identify high priority emission sources,

⁸ Bay Area Air Quality Management District, Base Year 1983 Emissions Inventory Summary Report, August 1987.

and require preparation of health risk assessments for each of these priority sources.

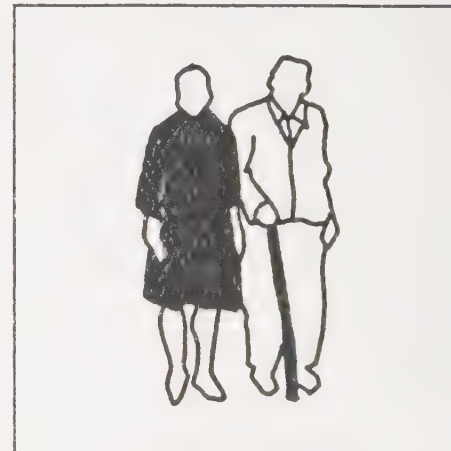
The inventory of toxic air contaminant (TAC) sources for the Bay Area identifies 71 sources of TACs within Sunnyvale. The majority of these sources are microelectronic industries, dry cleaners and auto repair businesses.

Of the 71 known TAC sources located in Sunnyvale only one, Lockheed Missiles and Space, was designated by the Bay Area Air Quality Management District as a high priority source based on the types and amounts of contaminants emitted. The results of the health risk assessment for this source classified this source as having a Level 0 impact, defined as a calculated maximum cancer risk of less than 10 in a million.⁹

Sensitive Receptors

The Bay Area Air Quality Management District defines **sensitive receptors** as those facilities most likely to be used by the elderly, children, infirm, or persons with particular sensitivity to air pollutants. Examples are hospitals, schools and convalescent homes. Such sensitive receptors are located throughout Sunnyvale.

Sensitive receptors need to be considered when locating new business or facilities that could emit air pollutants, particularly Toxic Air Contaminants. The siting of any new sensitive receptors also needs to consider any existing air pollutant sources nearby.



⁹ Bay Area Air Quality Management District, Toxic Air Contaminant Control Program Annual Report 1992, 1992.

FUTURE AIR QUALITY

FUTURE AIR QUALITY

Air quality in the Bay Area as a whole has been gradually improving over the last 20 years. This improvement has occurred despite substantial growth in population and industry. Increasingly stringent controls on mobile sources and stationary sources that have been adopted by the state of California and the Bay Area Air Quality Management District has affected this improvement. Nevertheless, the ambient air quality standards have not been met.

The California Clean Air Act of 1989 and federal Clean Air Act Amendments of 1990 require renewed efforts by state and local agencies to adopt rules and regulations that will improve air quality. These new rules will be regulating sources previously unregulated and making existing controls more stringent. Land use and transportation planning will become a more important aspect of air pollution improvement strategies.

Air quality as a whole has been improving in the Bay Area. It is forecasted to continue improving through the year 2000. However, forecasts through the year 2000, which are the longest forecasts available, do not demonstrate attainment of all state and federal air quality standards. Attainment of air quality standards requires fundamental changes in land use and travel patterns as well as continued implementation of existing and developing technologies.

The following discussion addresses the air quality implications of future growth within Sunnyvale on both local and regional air quality. The local air quality analysis projects concentrations of carbon monoxide near major intersections in Sunnyvale based upon projected traffic volumes assuming buildout under the General Plan. The regional air quality analysis examines the amount of new regional pollutants generated by population and

employment growth in Sunnyvale assuming build-out under the General Plan.

Local Air Quality

On the local scale, the pollutant of greatest interest is carbon monoxide. Concentrations of this pollutant are related to the levels of traffic and congestion along streets and at intersections.

Population and employment growth within Sunnyvale would affect carbon monoxide concentrations, particularly at major intersections. The **CALINE-4** computer simulation model was applied to ten selected intersections to estimate future carbon monoxide levels in Sunnyvale.

The intersections modeled were selected based upon total volumes of vehicles in the p.m. peak hour and/or levels of congestion. The CALINE-4 program and the assumptions made in its use are described in Appendix B.

The results of the CALINE-4 modelling for the ten selected intersections are shown in Figure 6. Concentrations are shown for existing conditions and in the year 2010 with projected traffic growth under the General Plan. The 1-hour concentrations in Figure 6 are to be compared to the state ambient air quality standard of 20 Parts Per Million (PPM) and the federal standard of 35 PPM, while the 8-hour concentrations in Figure 6 are to be compared to the state and federal standard of 9 PPM.

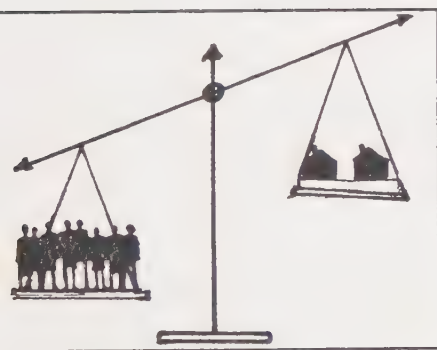
Existing concentrations are shown in Figure 6 to exceed the state and federal standards, a result that is reasonable given the nonattainment status of the area.

FIGURE 6
EXISTING AND YEAR 2010 CARBON MONOXIDE CONCENTRATIONS,
IN PPM

Intersection	Existing (1992)		General Plan Buildout (2010)	
	1-Hour	8-Hour	1-Hour	8-Hour
El Camino/Mary	17.1	11.2	10.9	6.5
Lawrence/Tasman	17.2	10.8	13.0	8.0
Lawrence/Homestead	21.1	13.5	14.1	8.7
Mathilda/Maude	19.7	12.6	11.8	7.1
Arques/Lawrence	19.4	12.2	13.4	8.3
Lawrence/Reed/ Monroe	21.1	13.6	13.9	8.6
Homestead/Saratoga- Sunnyvale	19.1	12.2	11.5	6.9
El Camino/Remington/ Fair Oaks	18.7	11.9	10.9	6.5
Old San Francisco/ Wolfe	17.5	11.0	11.1	6.6
Kifer/Wolfe	17.3	10.9	11.1	6.6

The applicable standards are 20 PPM for 1-hour and 9 PPM for 8-hours.

Year 2010 concentrations are predicted to be much lower than current levels due to state-mandated automobile emission standards for new vehicles. Year 2010 concentrations, even under worst case meteorological and traffic assumptions, are predicted to be below the applicable state and federal ambient standards. The above analysis is consistent with the Bay Area '91 Clean Air Plan, which predicts that, with current emissions controls on vehicles, such as catalytic converters, that carbon monoxide levels in the Bay Area would meet the carbon monoxide standard by the mid-1990's.



The Sunnyvale Futures Study examined the effects of revising the General Plan to provide for an improved jobs/housing balance by changing sites currently designated and developed with commercial and industrial uses to residential uses. The study examined four alternatives, each converting a different amount of industrial/commercial uses to residential uses. Carbon monoxide concentrations at seven major intersections were predicted in the year 2010 for all four alternatives and for buildout under the General Plan. Preliminary findings of the Sunnyvale Futures Study indicate that increased carbon monoxide concentrations will occur at certain intersections. However, no exceedances of the ambient air quality standards were predicted. This is primarily due to improvements in the job/housing balance which would provide Sunnyvale employees residing in other communities within the Bay Area and outlying areas with more local housing options. With more local housing options available, the likelihood is greater that commute lengths and vehicle miles traveled could be reduced.

Regional Air Quality

Future development within Sunnyvale would impact regional air quality. The effect of development would be

both direct and indirect. Direct impacts are those related to emissions released on-site from stationary sources. Indirect impacts are related to vehicle trips attracted to or generated by residential, commercial or employment-generating land uses.

Future growth in Sunnyvale may include new stationary sources of pollutants. Any new stationary sources, however, would be subject to the "no net increase" requirements of the California Clean Air Act that require the BAAQMD to develop a permitting system that provides that new sources can only be approved if there is an offsetting decrease in emissions elsewhere in the air basin. As a result, any new stationary sources in Sunnyvale would be offset so that there would be no net impact on regional air quality.

Indirect automobile emissions associated with buildout under the General Plan have been estimated using the URBEMIS-3 computer program developed by the California Air Resources Board. The incremental daily emission associated with this growth is shown in Figure 7 below for four regional pollutants: the two precursors of ozone (ROG and NOx), PM-10 and Sulfur Oxides (SOx). A description of the URBEMIS-3 model, the assumptions made in its use and the program output are included in Appendix C.

For comparison, county-wide emissions of the four regional pollutants are shown in Figure 7. While emissions from future growth in Sunnyvale represent only a very small fraction of county-wide emissions, they would be occurring during a time when substantial reductions in regional emissions will be required if all state and federal air quality standards are to be met. Similar increases can be expected within other cities within the south bay and the greater Bay Area as the region grows in population and economic activity. If unmitigated, the emissions shown in Figure 7 would delay attainment of air quality standards in

the region, although it is not possible to estimate what this delay would be.

The Sunnyvale Futures Study examined the emission changes associated with four Land Use alternatives using the URBEMIS-3 program. Because each of these alternatives increases the potential population of Sunnyvale, each was found to generate a significant amount of new automobile emissions. It was noted in the study, however, that improvement of the jobs/housing balance in Sunnyvale would have an unquantifiable but real effect on emissions outside Sunnyvale. Since trip lengths for home-to-work trips originating within Sunnyvale are shorter than any community in the Bay Area with the exception of San Francisco¹⁰ and Sunnyvale has transit options and a network of commuter lanes not prevalent in many other Bay Area communities, residential development within Sunnyvale would have a lesser impact on regional air quality than in most Bay Area communities.

Reducing emissions from indirect sources is likely to be an important strategy in regional efforts to attain the state and federal ambient air quality standards in the Bay Area. Indirect source review, with the imposition of control strategies similar to those within this Air Quality Sub-Element, is likely to be imposed on a regional basis in the near future. The adoption and implementation of this Air Quality Sub-Element would be consistent with the goals and strategies of regional air quality planning agencies, and would mitigate the effects of the emission increases shown in Figure 7.

¹⁰ Metropolitan Transportation Commission, Congestion Management Program Databook #1: Regional Summary, March 1991.

FIGURE 7

**INDIRECT EMISSIONS ASSOCIATED WITH GENERAL PLAN BUILDOUT
AND COUNTY-WIDE PROJECTED EMISSIONS, IN POUNDS/DAY**

	ROG	NOx	PM-10	SOx
Sunnyvale General Plan Buildout	981	1475	135	159
Santa Clara County ¹¹	339,280	276,260	364,000	15,000
Percent of County Emissions	0.29	0.53	0.04	1.06

 ROG = Reactive Organic Gases

NOx = Nitrogen Oxides

PM-10 = Particulate Matter, 10 microns

SOx = Sulfur Oxides

¹¹ County-wide emissions shown for ROG and NOx are for 1987; emissions for PM-10 and SOx are for 1983.

LOCAL AND REGIONAL AIR QUALITY ISSUES AND PROGRAMS

LOCAL AND REGIONAL AIR QUALITY ISSUES AND PROGRAMS

The federal government or federal courts will implement specific regulations regarding air quality if measures are not taken by state or local government agencies to clean up the air. There are many actions local governments can take to reduce congestion by identifying ways to reduce trips, increase transit options, and employ new technologies. Because of the familiarity with industries in their jurisdiction, local governments are able to work with those industries to develop strategies aimed at reducing air pollution.

The City of Sunnyvale has always been concerned with the quality of life of its citizens. Over the years, the City has taken numerous steps to improve air quality, both locally and regionally, through transportation improvements and land use planning and policies. Many of these actions have been directed at increasing the availability of commute alternatives and housing opportunities. Although there is no guarantee that people working in Sunnyvale will reside in Sunnyvale, or use commute alternatives, the likelihood is increased if the opportunities exist.

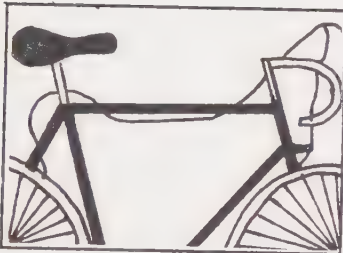
The City is cognizant of the interrelationship and effect traffic congestion and land use planning have on air quality. In attempts to improve air quality, the City has developed various programs, policies, and ordinances. Below is a brief description of local and regional efforts.

Local

The City of Sunnyvale has implemented a variety of local programs and ordinances aimed at or contributing to a reduction of air pollutant emissions or conserving air quality. Current and future programs and ordinances are summarized below.

Bicycle Plan/Bicycle Advisory Committee

The goal of the Sunnyvale Bicycle Plan is to encourage bicycling at the local, sub-regional, and regional levels. Safe and accessible bicycle and shared roadway facilities promote cycling which helps clean up the air. Sunnyvale currently has 1.7 miles of bike paths, 4.6 miles of bicycle routes and 15 miles of bicycle lanes.



Although not technically part of the General Plan, the Sunnyvale Bicycle Plan is consistent with and implements policies and action statements of the Transportation Element which calls for preparation of a formal Bicycle Plan. The Sunnyvale Bicycle Plan includes a Statement of Purpose which says:

"Sunnyvale shall encourage the use of bicycles for transportation and recreation, to minimize air pollution, energy consumption and traffic congestion".

Sunnyvale's Bicycle Plan also includes numerous goals and policies that directly address the need to: facilitate bicycling through the transportation planning process, improve linkages among different transportation modes, maintain a safe and effective system of bikeways and shared roadway facilities suitable for bicycles, and make provisions for education about the rights and responsibilities of cyclists and motorists. As part of the approval of the updated Bicycle Plan, the City Council also approved the formation of the Bicycle Advisory Committee (BAC). The BAC will be responsible for reviewing capital improvement projects involving bicycle facilities as well as educational programs that the City may wish to implement.

Bicycle Facilities

In the last ten years, several factors have contributed to an increased use of bicycles for commuting and recreation activity, both locally and regionally: increasing traffic congestion, increasing awareness of air quality issues, and increasing emphasis on health and physical exercise.

The Santa Clara County Congestion Management Agency (CMA) has developed requirements for bicycle facilities that are intended to meet community needs and promote regional consistency.

The City of Sunnyvale is evaluating the feasibility of requiring bicycle parking/storage facilities in all new and existing multi-family residential developments, when possible, and parking/storage, shower and clothing locker facilities in new and existing commercial and industrial developments, when possible.

City Sidewalks

The City of Sunnyvale requires the installation of sidewalks within the public right-of-way in connection with all new development. A previous City policy relating to industrial areas, which only required sidewalks along a few major streets, has been modified to require installation of sidewalks along all frontages on public streets. This requirement is triggered, not only by new developments, but also by major expansions of existing buildings.

Preferential Parking

The Zoning Ordinance requires that preferential parking be provided for pool vehicles whenever traffic mitigation measures are imposed in connection with a discretionary approval and whenever new construction occurs in an industrial zoning district. The Zoning Ordinance specifies



that ten percent of the parking spaces be permanently reserved for pool vehicles and that these spaces be the closest ones to the principal building on the premises. In connection with discretionary approvals, more restrictive conditions are imposed which would require one carpool vehicle space per 5 total parking spaces, one vanpool space per 100 parking spaces, and one lockable, covered bicycle space per 30 parking spaces.

Water Pollution Control Plant Gas Control/Recovery System

Methane gas is created within a water pollution control plant by the action of bacteria on the waste. Rather than releasing this organic gas into the atmosphere, the City has installed a system whereby this gas is captured. A portion of this gas is burned to produce a portion of the energy requirements of the Water Pollution Control Plant, the remainder is burned in a flare.



Tree Planting Program and Tree Preservation Ordinance

Trees perform a beneficial function for air quality, capturing and removing airborne dust and particulates, removing carbon monoxide and carbon dioxide from the atmosphere, and creating oxygen. The City's tree planting program and tree preservations ordinance are efforts with secondary air quality benefits.

Traffic Signal Improvement and Synchronization

The City is constantly updating its traffic signals utilizing new technological equipment. Approximately half of the signals in Sunnyvale are on an interconnect system, which allows traffic to move more freely on major thoroughfares and decreases the idling time at intersections. Since vehicles generate less air pollutant emissions at higher speeds, congestion management has air quality benefits.

Sunnyvale's Futures Study

The Futures Study is a comprehensive review of the land use patterns in the City. The Study began in 1988 as the result of earlier Golden Triangle Task Force findings that traffic congestion and the jobs/housing imbalance were two of the biggest problems facing Santa Clara Valley. The Sunnyvale City Council initiated the Futures Study as part of an effort to improve the quality of life by: reducing traffic congestion, improving the ratio of housing units to jobs, and increasing the opportunities for public transit use. In addition, the economic vitality of the commercial and industrial sectors would be enhanced by including opportunities to off-set potential job loss and to provide opportunities for different kinds of industrial, office and retail development along major transportation corridors than is currently permitted.

Providing housing near jobs may result in localized air quality concerns; however, the effect regionally is improved air quality as commute distances are shortened. Although there is no guarantee that residents working in Sunnyvale will live in Sunnyvale, the likelihood is greater if the opportunities exist. The Study evaluates a wide range of opportunities to guide the future development of the City in a balanced and efficient manner.

Fleet Management and Alternative Fuels Program

The City is studying a proposed 10-year master plan for the introduction of alternative fuels and improving the overall efficiency of the City's fleet of vehicles. The master plan proposes several methods of reducing fuel use (and air pollutant emissions) and provides recommendations regarding the introduction of Compressed Natural Gas (CNG) vehicles into the vehicle fleet.

Ten Year Capital Improvements Plan

The Ten-Year Plan incorporates a wide variety of capital improvement and special projects. The capital improvement projects require a major initial investment, a continuing financial commitment and/or the eventual replacement of the City's infrastructure and major operating equipment. A component of the Ten-Year Plan includes street maintenance and improvements and a variety of transportation projects to support bicyclists and pedestrians.



The city staff also seeks state and federal funding to implement both designated Ten-Year Plan capital improvement projects and new or expanded projects to support the General Plan and Air Quality goals, policies, and actions. Examples of Federal and State funding sources include Inter-modal Surface Transportation Efficiency Act (ISTEA), Transportation Enhancement Activities (TEA), and the Transportation Development Act, Article 3 (TDA, Article 3). Recent candidate projects have included sidewalk, curb and gutter projects, a variety of bicycle support facilities including the purchase of bicycle lockers and racks to be placed at transit stations and community centers, and additional resources for the bicycle safety education program.

Regional

The City of Sunnyvale is involved in various regional projects and has implemented a variety of regional programs and ordinances aimed at or contributing to a reduction of air pollutant emissions or conserving air quality. These current and future projects, programs, and ordinances are summarized below.

Measure A (1984)

In 1984, county voters approved a one-half-cent sales tax, Measure A, to raise \$1 billion for improvements on three regional roadways--Highways 101 and 85 and Route 237. Since then, high occupancy lanes have been added to these roadways and have greatly expanded their capacity. As a result, congestion has decreased considerably.

Measure A (1992)

In November, 1992, Santa Clara County voters agreed to continue the half-cent sales tax for transportation improvements. The expenditure plan consists of three transportation elements: rail transit, express bus transit, and highways. Specific projects were selected for their ability to improve air quality, alleviate traffic congestion, and attract regional, state and federal funds to maximize the buying power of local dollars. Each project in the plan is beneficial on its own merits, but is further enhanced as a portion of the overall system of transit and transportation improvements to improve air quality and keep Santa Clara County residents and workforce moving. Some of the projects identified in the plan would have an effect on Sunnyvale. They include:

- Tasman Light Rail Extension
- Increase in Caltrain Service
- Sunnyvale-Cupertino rail extension
- "Super Express" Commuter Bus Service
- Transit Service for Disabled Seniors and Transit Dependent

- Interchanges on 237 at Maude and Middlefield Roads
- Signal Synchronization on Lawrence and Central Expressways

Lawrence Expressway High Occupancy Vehicle (HOV) Project

The Lawrence Expressway HOV project includes the construction of two additional lanes, one in each direction, on Lawrence Expressway between State Route 237 to the North and Interstate 280 to the South. The two additional lanes will be HOV lanes bringing the total number of lanes on Lawrence Expressway to eight. The City of Sunnyvale along with the City of Santa Clara and the Santa Clara County Road fund are providing the local matching portion of funding for this project. The completion date for this project is expected to be late 1997.

Transportation Demand Management (TDM)/Trip Reduction Rule

Transportation Demand Management (TDM)

In 1990, the City passed a TDM ordinance. The goal of the ordinance is to have employers achieve average vehicle ridership goals by implementing a TDM program. The ordinance requires employers with 100 or more employees to: designate a manager to oversee the TDM program, appoint a commute coordinator who must complete an approved training course, submit a work site designation form, file a baseline TDM report for each work site, and submit an annual TDM report.

Trip Reduction Rule

In December, 1992, the Bay Area Air Quality management District (BAAQMD) passed Regulation 13, Rule 1 - Trip Reduction Requirements for large employers. The purpose is to decrease air pollutant emissions from motor vehicles by reducing their use in traveling to and from work sites. The rule will apply to all public and private employers with work sites of 100 or more employees. If an employer has multiple work sites, only those sites with 100 or more employees are subject to the rule. Employers which have 100 or more employees in total, but no single work site with 100 or more employees, are not subject to the rule. The rule provides exemptions for the following:

- work sites of 100 or more employees where less than 50 employees start work during the peak period (6 am through 10 am),
- construction sites;
- work sites where the 1999 performance objectives are achieved;
- work sites located in a jurisdiction where implementation of the rule has been delegated to a local implementing agency. (At this time, delegation acceptance has not been determined by cities within Santa Clara County).

Employers which are subject to the rule are required to comply with the following requirements: employee notification; appointment of an Employee Transportation Coordinator and an Employee Program Manager; registration of all work sites subject to the rule; an annual employee transportation survey; and development and implementation of an Employer Trip Reduction Program. The rule defines geographic zones and annual



performance objectives that apply in each zone. Work sites that do not demonstrate achievement of the applicable ridership performance objective via the employee transportation survey are required to submit an Employer Trip Reduction Plan to the BAAQMD (or delegated local jurisdiction) for review and approval. Disapproval of an Employer Trip Reduction Plan may be appealed to an Employer Trip Reduction Appeals Committee.

Requirements for employment centers (multi-tenant complexes) are not included in this rule. They will be addressed in a separate rule (Regulation 13, Rule 2) to be developed subsequent to the adoption of Rule 1. If Santa Clara County cities decide not to accept delegation, the trip reduction rule will be implemented by the BAAQMD.

Toxic Gas Ordinance

The City's Toxic Gas Ordinance regulates air pollutants which are dangerous at very low concentrations. The ordinance, which was applicable to existing as well as future facilities that use such materials, places engineering and administrative controls designed to protect the public from acute exposure to an accidental release of a toxic gas. The ordinance divides regulated materials into three hazard classes, with more stringent controls applied to the more hazardous classes of materials.

Landfill Gas Recovery System

Sanitary landfills are a source of organic gases created by the breakdown of materials in the landfill. Even after closure, these gases continue to be created and may gradually escape to the atmosphere, where they are ozone precursors. In response to BAAQMD regulations, the City has installed a gas recovery system at the City's landfill site.

The landfill gas, whose primary constituent is methane, is flammable and is burned, creating carbon dioxide and water.

Sunnyvale Materials and Recovery Transfer (SMaRT) Station

The SMaRT station is located at 301 Carl Road at the Borregas Avenue intersection. It will operate under a permit from the BAAQMD. Transfer stations/recycling facilities are sources of particulate emissions and minor amounts of organic gases. The emission controls in place at this facility include overall limits on the amounts of materials handled by the transfer station and wood waste operations, a wet suppression system, enclosures and a baghouse to remove particulate matter.



INTERRELATIONSHIPS WITH OTHER SUB-ELEMENTS

INTERRELATIONSHIPS WITH OTHER SUB-ELEMENTS

The General Plan of the City of Sunnyvale is composed of seven elements: Transportation, Community Development, Environmental Management, Public Safety, Socio-Economics, Cultural, and Planning and Management. The Air Quality Sub-Element is part of the Environmental Management Element which includes six other sub-elements: Water Resources, Solid Waste Management, Sanitary Sewer system, Energy, Noise, and Surface Runoff

Altogether, there are a total of 24 elements or sub-elements within Sunnyvale's General Plan. The interrelationship of the Air Quality Sub-Element with the goals and policies of those elements or sub-elements that are relevant, is summarized below.

Community Design Sub-Element

The Community Design Sub-element contains the following policy influencing or supporting air quality goals:

Policy B.2: Provide a safe and comfortable system of pedestrian and bicycle pathways.

Land Use Sub-Element

The Land Use Sub-Element contains the following policies influencing or supporting air quality goals:

Policy C.1: A focus for higher intensity uses should occur along existing multi-modal transit corridors or where these used can provide transit capabilities as a condition of development.

Policy C.7: Mixed uses are encouraged in those areas identified as suitable for a high intensity use or as means to provide residential uses adjacent to employment centers.

Housing and Community Revitalization Sub-Element

The Housing and Community Revitalization Sub-Element contains the following policies influencing or supporting air quality goals:

Policy A.1: Continue to improve, if feasible, the existing jobs to housing ratio.

Policy C.2: Continue to require a mix in the price of housing units in new subdivisions and apartment complexes as a way of distributing low and moderate cost housing throughout the City.

Energy Sub-Element

The Energy Sub-Element contains several goals and policies influencing or supporting air quality goals:

GOAL A: Provide for safe and efficient vehicular movement on streets.

Policy A.1: Maintain traffic control devices in good operating conditions.

Policy A.2: Optimize traffic signal system performance.

Policy A.3: Work closely with other jurisdictions responsible for roadways within Sunnyvale to improve traffic flow.

GOAL B: Promote convenient and efficient alternatives to the automobile.

Policy B.1: Support a transit service that provides a convenient and inexpensive alternative to the auto for both Sunnyvale residents and residents of other communities travelling to Sunnyvale.

Policy B.2: Create and maintain a safe and effective system of roadways and bikeways suitable for bicycle use.

Policy B.4: Provide a pleasant and safe environment for pedestrian movement.

Policy B.5: Provide facilities that encourage integrated usage of different modes of transportation.

GOAL C: Increase ridesharing, the use of non-auto travel modes, and off-peak travelling in order to reduce traffic congestion, energy consumption and air pollution.**Transportation Element**

The Transportation Element contains several goals and policies influencing or supporting air quality goals:

GOAL A: Provide for safe and efficient vehicular movement.

Policy A.1: Monitor the operation and performance of the street system.

Policy A.3: Maintain traffic control devices in good operating condition.

Policy A.4: Achieve an operation level of service D or better for all arterials, collectors, and intersections during the peak hours.

Policy A.5: Optimize traffic signal system performance.

GOAL B: Promote convenient and efficient alternatives to the automobile.

Policy B.1: Support a transit service that provides a convenient and inexpensive alternative to the auto for both Sunnyvale residents and residents of other communities travelling to Sunnyvale.

Policy B.3: Create and maintain a safe and effective system of roadways and bikeways suitable for bicycle use.

Policy B.4: Assure the provision of adequate bicycle support facilities at all major bicycle usage locations.

Policy B.5: Provide a pleasant and safe environment for pedestrian movement.

Policy B.6: Provide facilities that encourage integrated usage of different modes.

GOAL C: Increase ridesharing, the use of non-auto travel modes, and off-peak travelling in order to reduce traffic congestion, energy consumption and air pollution.

Policy C.1: Work with the County, individual employers, and the Santa Clara County Manufacturing Group to encourage ridesharing and off-peak commuting.

Policy C.2: Promote ridesharing and transit use to the general public.

Policy C.3: Encourage the bicycle as a means of transportation for persons of every age for a variety of purposes.

Socio-Economic Element

The Socio-Economic Element contains the following policy influencing or supporting air quality goals:

Policy B.4: Participate in regional efforts to respond to transportation and housing problems caused by economic growth in order to improve the quality of life and create a better environment for business to flourish.

GOALS, POLICIES AND ACTION STATEMENTS

GOALS, POLICIES AND ACTION STATEMENTS

Introduction

The Air Quality Sub-Element of the City of Sunnyvale's General Plan establishes a set of integrated goals, policies, and action statements which guide decision making and lead toward improved air quality.

This sub-element is one of several sub-elements of the General Plan. The goals and policies of this sub-element affect and can be affected by other sub-elements and thus must be integrated with other sub-elements.

Programs to achieve the goals, policies and action statements of this Sub-Element are currently being developed and implemented by other agencies, including the BAAQMD and the Congestion Management Agency. This Sub-Element formalizes the City's policy to protect the environmental quality of Sunnyvale and the larger Bay Area and its intent to fully participate in implementing these programs. By adopting this Sub-Element, it is not the City's intent to create duplicative, contradictory or more stringent requirements at this time.

In the future, the City will continue to monitor air quality and will respond to changing community conditions or specific situations and new or revised requirements as appropriate. The City will continue its policy of working with and informing businesses of the need for and the content of any proposed future legislative changes and will consider the import of proposed changes on the business community.

Goals, policies, and action statements in this Air Quality Sub-Element are based on sound planning principles and

basic findings of fact previously outlined in this document. These include:

1. Some of the pollutants in the atmosphere in Sunnyvale are generated in upwind cities and transported to the City by the prevailing winds. The City's ability to control such emissions is limited; measures to control these pollutants must be regional in nature.
2. A large portion of the air pollution in Sunnyvale is generated locally and is partially controllable by City policies. The exposure of Sunnyvale's residents to local pollutants such as carbon monoxide, dust, odors and toxic air contaminants is directly a result of the local transportation system and land use patterns.
3. One of the major reasons that air quality continues to be a problem in the Bay Area specifically and California in general, is a relatively high rate of population and economic growth. Major progress has been made in past years in reducing emissions from stationary sources and mobile sources in the Bay Area, with the result that steady improvement in air quality has been documented despite population growth. Under the impetus of the 1990 Clean Air Act Amendments and California Clean Air Act, the state Air Resources Board and BAAQMD have and will be adopting new and more stringent regulations on existing and future industrial sources, implementing more stringent emission standards for vehicles, developing and implementing Transportation Control Measures (TCMs) to reduce vehicular emissions, and adding new sources to the list of controlled processes (e.g., consumer products, fireplaces and wood stoves, etc.). These measures, if implemented expeditiously, should continue the overall

improvement in air quality evident over the past 20 years.

4. The major obstacle to improved air quality in the future is increasing population and vehicle use and deteriorating operating conditions on highways and roads. The extent that future growth affects air quality will be partially determined by the form that new land uses take, and the transportation and housing options available to new residents.
5. Sunnyvale is within the nine-county Bay Area Air Quality Management District and within the Bay Area Air Basin. This air basin has been identified as not meeting all State and Federal air quality standards. Since Sunnyvale contributes to the emissions burden of the region, Sunnyvale should make a contribution towards reducing overall emissions within the air basin.

Goals

Air Quality goals are organized under three headings:

- A. Air Quality and Exposure (GOAL A)
- B. Future Development (GOAL B)
- C. Regional Air Quality (GOAL C)

**GOAL A: IMPROVE SUNNYVALE'S AIR QUALITY
AND REDUCE THE EXPOSURE OF ITS CITIZENS
TO AIR POLLUTANTS**

**POLICY A.1: Require all new development to
utilize site planning to protect
citizens from unnecessary exposure
to air pollutants.**

Action Statements:

A.1.a. Evaluate new development with potential sources of odors or criteria air pollutants to determine whether it is appropriate for them to be located near existing or planned residential development or sensitive receptors.

A.1.b. New residential zones or residential development in non-residential zones should not be permitted near existing sources of TAC's, unless it can be shown through a Health Risk Assessment that no unacceptable health risk is created.

A.1.c. New residential development should be located at least 15 feet from the property line along major streets or intersections unless a lesser distance can be demonstrated to not expose residents to unhealthful pollutant concentrations.

POLICY A.2: Reduce automobile emissions through traffic and transportation improvements. Since traffic congestion delays increase the level of emissions, congestion management has air quality benefits.

Action Statements:

- A.2.a. Develop and maintain a balanced transportation system in Sunnyvale by promoting pedestrian, bicycle and transit modes of travel.
- A.2.b. The City should give high priority to traffic improvements that improve vehicle operating conditions (average speed, delay) such as signal timing improvements, signal synchronization, turn lanes, etc. BAAQMD guidance developed for the CMP program deficiency plans defines such improvements.

GOAL B: REDUCE AIR POLLUTION IMPACTS FROM FUTURE DEVELOPMENT

POLICY B.1: Utilize land use strategies to reduce air quality impact.Action Statements:

- B.1.a. Promote extension of transit systems, and locate higher density development/redevelopment along transit corridors.
- B.1.b. Promote mixed land use development that provides commercial services such as day care, restaurants, banks and stores near employment centers, reducing auto trip generation by promoting pedestrian travel. Promote neighborhood commercial and park uses within residential developments to reduce short auto trip generation by making pedestrian and bicycle

trips feasible (for example, require sidewalks, bike trails and bicycle parking areas).

POLICY B.2: Assist employers in meeting requirements of Transportation Demand Management (TDM) plans for existing and future large employers and participate in the development of TDM plans for employment centers in Sunnyvale.

Action Statements:

B.2.a. Enforce the provisions of the City's TDM ordinance covering businesses employing 100 or more persons.

B.2.b. Amend the City's existing TDM ordinance to comply with the BAAQMD's Trip Reduction Rule.

B.2.c. At the appropriate time, the City should explore the feasibility of seeking delegation of regulations which would affect smaller employers located within multi-tenant complexes, which are not included in the Trip Reduction Rule authority from the Bay Area Air Quality Management District.

POLICY B.3: Apply the Indirect Source Rule¹² to new development with significant air quality impacts. Indirect Source review would cover commercial and residential projects as well as other land uses that produce or attract motor vehicle traffic.

¹² The Bay Area '91 Clean Air Plan contains as a Transportation Control Measure the development of a rule to reduce vehicle trips to airports, arenas, universities, residential developments, shopping centers and other indirect sources. The current intent is that the BAAQMD would delegate this authority to local agencies if certain criteria are met--one being the adoption of an adequate Air Quality Element.

Action Statements:

- B.3.a. Increase densities near transit stations.
- B.3.b. Develop requirements for bicycle and pedestrian facilities.
- B.3.c. Require site design to encourage transit circulation and stops/waiting areas for transit and carpools.
- B.3.d. Consider controls to decrease vehicle idling emissions caused by "drive-through" operations.

GOAL C: MAKE A CONTRIBUTION TOWARDS IMPROVING REGIONAL AIR QUALITY

POLICY C.1: The City should actively participate in regional air quality planning.Action Statements:

- C.1.a. The City should work with regional air quality planning agencies such as the Bay Area Air Quality Management District, **Metropolitan Transportation Commission, Association of Bay Area Governments**, and Congestion Management Agency in the development and implementation of regional air quality strategies.
- C.1.b. Continue to monitor federal and state legislation regarding air quality issues.

POLICY C.2: Improve opportunities for citizens to live and work in close proximity.

Action Statements:

- C.2.a. In the long term, the City should encourage a better balance between jobs and housing than currently exists in Sunnyvale to reduce long distance commuting.
- C.2.b. The City should encourage affordable housing.

POLICY C.3: Contribute to a reduction in Regional Vehicle Miles Travelled.

Action Statements:

- C.3.a. The City should support and actively promote the expansion and improvement of local and regional transit systems providing service to Sunnyvale.
- C.3.b. The City should be a leader in implementing the Transportation Control Measures (TCM's) that are included in the Bay Area '91 Clean Air Plan, the regional plan required under the California Clean Air Act. The Plan currently includes 23 TCMs. Of these the following identify cities as an implementing agency:

- TCM 1: Expand Employer Assistance Programs
- TCM 2: Adopt Employer-Based Trip Reduction Rule
- TCM 9: Improve Bicycle Access and Facilities
- TCM 12: Improve Arterial Traffic Management
- TCM 13: Transit Use Incentives
- TCM 15: Provide Carpool Incentives
- TCM 16: Indirect Source Control Program

TCM 18: Zoning for Higher Densities near Transit Stations

TCM 19: Air Quality Elements for General Plans

POLICY C.4: Reduce Emissions from City of Sunnyvale fleet vehicles

Action Statements:

- C.4.a. As a large employer, the City will provide leadership in the implementation of air quality programs such as the Trip Reduction Ordinance.
- C.4.b. The City will evaluate the development and implementation of a program to introduce and expand the use of alternative, cleaner fuels in its fleet of vehicles.

APPENDIX A

GLOSSARY

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GLOSSARY

Air Quality Standard: The specified average concentration of an air pollutant in ambient air during a specified time period at or above which undesirable effects may be produced. Both national and state standards exist; in general the state standards are the more stringent.

Association of Bay Area Governments (ABAG): A voluntary association of counties and cities (otherwise known as a Council of Governments) this is the land-use planning agency for the nine-county San Francisco Bay Area.

Bay Area Air Quality Management District (BAAQMD): A nine-county regional district with permit authority over all stationary sources of air pollutants. The District maintains inventories of air pollution sources and monitors air quality with a network of monitoring stations. Under the California Clean Air Act, the BAAQMD is responsible for the preparation of the regional Clean Air Plan.

California Clean Air Act: A law setting forth a comprehensive program to ensure that all areas within the State of California will attain federal and state ambient air quality standards by the earliest practicable date. Also known as the Sher Bill or AB-2595, the law mandates comprehensive planning and implementation efforts, and empowers local air pollution control districts to adopt transportation control measures and indirect source control measures to achieve and maintain the ambient air quality standards.

CALINE-4 Model: A model developed by the California Department of Transportation which calculates ambient concentrations of carbon monoxide from vehicular traffic on a roadway segment, intersection, or parking lot.

Congestion Management Agency: A county-wide organization responsible for preparing and implementing the county's CMP. CMA's came into existence as a result of state legislation and the voters' approval of Proposition 111 in 1990.

Congestion Management Program (CMP): A state mandated program that requires each county to prepare a plan to relieve congestion and air pollution.

Criteria Pollutants: Air pollutants for which the federal or state governments have established ambient air quality standards, or criteria, for outdoor concentration in order to protect public health.

Indirect Source: A development, facility, building, structure, installation or highway improvement that attracts mobile sources of air pollutants (vehicles). Examples of indirect sources are major highways and airports, shopping centers, sport complexes, recreational facilities and major parking facilities.

Inversion: A condition of the atmosphere in which temperature increases or remains constant with altitude. Such conditions greatly reduce vertical mixing of the atmosphere.

Metropolitan Transportation Commission (MTC): The transportation planning and financing agency for the nine-county San Francisco Bay Area.

Nonattainment Area: Both the State and Federal Clean Air Acts require the California Air Resources Board to designate all air basins within California as attainment, nonattainment or unclassified with respect to the State and National ambient air quality standards. The nonattainment designation indicates that, based on available air quality data, that the standard is currently not being met in the air basin.

Ozone Precursors: Primary pollutants involved in the photochemical production of ozone in the urban atmosphere, hydrocarbons (also known as Reactive Organic Gases) and oxides of nitrogen.

Photochemical Smog: A general term used to describe dense, visible air pollution. While the term smog is often applied to any visible pollution, photochemical smog is a summertime, warm weather phenomena resulting from the reaction of different pollutants in the atmosphere in sunlight to create a brownish, irritating haze.

Point Source: A sizeable stationary emission source at a specific location, such as a factory, refinery or power plant.

Pollution Potential: The relative ability of the atmosphere to transport or dilute pollutants. Determined by physiographic and climatic factors alone, it can be considered quantitatively as the concentration resulting from a unit amount of pollution emitted.

Sensitive Receptors: Sensitive populations such as children, athletes, elderly and the sick that are more susceptible to the effects of air pollution than the population at large.

Toxic Air Contaminants: Air pollutants that are carcinogens or produce acute effects. Toxic air pollution thresholds are based on a quantitative risk assessment rather than ambient air quality standards as with criteria pollutants.

APPENDIX B

CALINE-4 MODEL AND ASSUMPTIONS

APPENDIX B

CALINE-4 MODEL AND ASSUMPTIONS

The CALINE-4 model is a fourth-generation line source air quality model that is based on the Gaussian diffusion equation and employs a mixing zone concept to characterize pollutant dispersion over the roadway.¹ Given source strength, meteorology, site geometry and site characteristics, the model predicts pollutant concentrations for receptors located within 150 meters of the roadway. The CALINE-4 model allows roadways to be broken into multiple links that can vary in traffic volume, emission rates, height, width, etc.

The intersection mode of the model was employed, which distributes emissions along each leg of the intersection for free-flow traffic, idling traffic and accelerating and decelerating traffic. The intersection model extended 250 meters in all directions. Receptors (locations where the model calculates concentrations) were located at distance of 10 meters from the roadway edge for all four corners of the intersection.

The worst case mode of the CALINE-4 model was employed. In this mode the wind direction is varied to determine which wind direction results in the highest concentration for each receptor. Emission factors were derived from the California Air Resources Board EMFAC-7EP model. Adjustments were made for vehicle mix and hot start/cold start/ hot stabilized percentages appropriate to each roadway. Temperature was assumed to be 40 degrees F.

The computation of carbon monoxide levels assumed the following worst-case meteorological conditions:

Windspeed: 1 mps

Stability: F Category

Mixing Height: 1000 meters

Surface Roughness: 100 cm

Standard Deviation of Wind Direction: 10 degrees

The CALINE-4 model calculates the local contribution of nearby roads to the total concentration. The other contribution is the background level attributed to more distant traffic. The background levels assumed for 1992 were 10.6 and 6.2 PPM for the 1-hour and 8-hour averaging times, respectively. The background levels for 2010 were taken as 7.9 and 4.4 PPM for the 1-hour and 8-hour averaging times, respectively. These background values were derived from published sources.²

To generate estimates of 8-hour concentrations from the 1-hour CALINE results a persistence factor of 0.7 was employed.

¹ California Department of Transportation, CALINE-4- A Dispersion Model for Predicting Air Pollutant Concentrations Near Roadways, Report No. FHWA/CA/TL-84-15, 1984.

² Bay Area Air Quality Management District, Air Quality and Urban Development, November 1985. (Revised April, 1991)

APPENDIX C

URBEMIS-3 PROGRAM AND ASSUMPTIONS

APPENDIX C

URBEMIS-3 PROGRAM AND ASSUMPTIONS

Estimates of regional emissions generated by project traffic were made using a program called URBEMIS-3. URBEMIS-3 is a program that estimates the emissions that would result from various land use development projects. A land use project can include residential uses such as single-family dwelling units, apartments and condominiums, and nonresidential uses such as shopping centers, office buildings, and industrial parks. URBEMIS-3 contains default values for much of the information needed to calculate emissions. However, project-specific, user-supplied information can also be used when it is available.

The following is a description of the parameters that were used in the regional air quality analysis of the proposed project:

-Ambient Temperature: 60 degrees F.

-Trip Lengths:

Home Based Work	7.48 miles
Home Based Shop	4.06 miles
Home Based Other	5.79 miles
Work Based Work	11.12 miles
Work Based Non-Work	5.18 miles

-Year of Analysis: 2010

-Average Speed: 30 miles per hour

Trip lengths were taken from Metropolitan Transportation Commission travel statistics for Sunnyvale.¹

¹ Metropolitan Transportation Commission, Bay Area Travel Forecasts, Congestion Management Program Databook #1: Regional Summary, March 1991.

RESOLUTION

RESOLUTION NO. 166-93

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF
SUNNYVALE AMENDING THE GENERAL PLAN BY ADDING THERETO
AN AIR QUALITY SUBELEMENT

WHEREAS, the Department of Community Development has proposed an amendment to the 1972 General Plan of the City of Sunnyvale, as amended, to add the Air Quality Subelement thereto, which proposed Subelement is set forth in Report to Council No. 93-354 dated July 13, 1993; and

WHEREAS, this project was determined to be categorically exempt from the requirements of the California Environmental Quality Act of 1970, as amended, and City Council Resolution No. 193-86; and

WHEREAS, the Planning Commission held a noticed public hearing on the proposed amendments on May 24, 1993, after which the Planning Commission recommended that the City Council adopt the amendment; and

WHEREAS, the City Council held a noticed public hearing to consider adoption of the amendment on July 13, 1993, at which time certain amendments to the Subelement were approved;

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF SUNNYVALE THAT:

1. The City Council finds and determines that the proposed amendment conforms with the requirements provided for in the Sunnyvale Municipal Code, that it is a suitable and logical change of the General Plan for the development of the City of Sunnyvale, and that it is in the public interest.

2. The Air Quality Subelement as adopted, a copy of which is

on file in the Office of the City Clerk of the City of Sunnyvale, is hereby added to the 1972 General Plan of the City of Sunnyvale. The above-described Subelement, incorporating amendments approved at the time of adoption, is hereby incorporated by this reference.

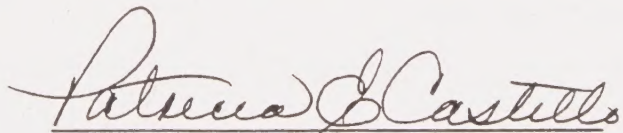
3. The Mayor and City Clerk are directed to endorse the amendment to the 1972 General Plan of the City of Sunnyvale and to show that the same has been adopted by the City Council.

4. The City Clerk is directed to file a certified copy of the amendment to the 1972 General Plan of the City of Sunnyvale with the Board of Supervisors and the Planning Commission of the County of Santa Clara and the planning agency of each city within the County of Santa Clara. The City Clerk is directed further to file a certified copy of the amendment with the legislative body of each city, the land of which may be included in the plan.

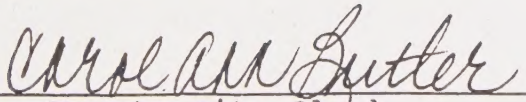
Adopted by the City Council at a regular meeting held on July 13, 1993, by the following vote:

AYES: KAWCZYNSKI, WALDMAN, STONE, PARKER, ROWE, CASTILLO
NOES: NONE
ABSENT: NONE
ABSTAIN: NAPIER

APPROVED:


Mayor

ATTEST:
City Clerk

By 
Deputy City Clerk
(SEAL)

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